Handbook on FEMA's Agency Specific Procedures for the Principle, Requirements, and Guidelines (PR&G) Analysis

March, 2018

FEMA

Table of Contents

Introduction

The Principles, Requirements, and Guidelines for Federal Investments in Water Resources (PR&G) govern how Federal agencies evaluate proposed water resource projects by providing a common framework for Federal agencies to analyze potential water resource investments. The PR&G apply to Federal investments that by purpose, directly or indirectly, alter water resources by affecting water quality or quantity, and have at least $10 million in project costs. These water resources projects include projects involving navigation, flood control, water supply, hydropower, ecosystem restoration, or recreation.

The PR&G is composed of three guiding documents:

1. Principles and Requirements for Federal Investments in Water Resources, March 2013
2. Interagency Guidelines, December 2014
3. FEMA's PR&G Agency Specific Procedures, August 2016

FEMA's PR&G Agency Specific Procedures are found in Chapters 3 and 4 of the FEMA EHP Instruction 108-1-1.

This handbook is intended to assist EHP staff to complete PR&G analyses. For projects where the PR&G applies but an Environmental Assessment is not required, the handbook provides a template for creating a stand-alone PR&G analysis. For projects where both an Environmental Assessment under NEPA and a PR&G analysis is required, the handbook provides information to integrate the PR&G analysis into the NEPA document.

Background

Previous to the PR&G, the 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, commonly known as the P&G, provided direction to the U.S. Army Corps of Engineers (USACE), the Tennessee Valley Authority (TVA), Natural Resources Conservation Service, and the Bureau of Reclamation for evaluating and selecting major water projects, including projects related to navigation, storm resilience, wetland restoration, and flood prevention. In the Water Resources Development Act of 2007, Congress instructed the Secretary of the Army to develop a new P&G. During the update process, the Obama Administration broadened the scope of the PR&G to cover more of the Federal agencies engaged in water resources projects to promote consistency and informed decision across the Federal government. The PR&G applies to seven Federal agencies, including the USCAE, the Environmental Protection Agency, the Department of Agriculture, the Department of the Interior, the Department of Commerce, the TVA, and DHS FEMA. The updated PR&G is intended to provide a framework for Federal agencies to evaluate proposed water resources projects that balances consideration of economic, social, and environmental objectives.

PR&G Applicability

There are two triggers which establish PR&G applicability. **The first trigger is the project scope must by purpose, directly or indirectly, affect water quality or quantity.** The FEMA EHP Instruction establishes the PR&G applies to projects whose scope includes **one of the following**: [1]

- New or existing Federal investments to construct new infrastructure, modify or replace existing infrastructure, or implement major changes to operations of Federal assets;
- Ecosystem restoration activities that have direct or indirect impacts on water quality or quantity;
- Existing assets that may not result in changes in water quality or quantity by themselves, but without which unintended changes to water resources may occur. These situations may occur when existing infrastructure may fail or degrade in the absence of additional Federal investment, resulting in change in quality or quantity of water resources or level of service provided. Examples include but are not limited to dam safety modifications of existing projects and major rehabilitation or replacement of facilities that have exceeded their useful life; or
- Activities where FEMA is responsible for implementation of an action, or when another party is responsible for implementation using Federal funds.

The second trigger is a financial threshold. The PR&G applies to projects with a Federal investment of $10 million or more, or as amended by the Interagency Guidelines. Water resource projects that only meet or exceed the monetary threshold due to project bundling may not require a PR&G analysis if no other thresholds triggering the PR&G are met.

Some projects are excluded from PR&G analysis.[2] Exclusions from the PR&G include:

1. Projects with less than $10 million dollars of Federal investment
2. Regulatory actions
3. Research or monitoring activities
4. All actions administered under the National Flood Insurance Program, including the Flood Mitigation Assistance Program area. (Note that because the National Flood Insurance Program is excluded from the scope of the PR&G, the PR&G does not apply to any projects funded by Flood Mitigation Assistance grants. However, the PR&G *does* apply to Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Program (HMGP) grants.)

Scoping the PR&G Analysis

For projects which meet the two applicability triggers, there are two possible levels of analysis. EHP staff should apply a **scaled analysis** to projects with $10 million up to $20 million in costs. EHP staff should apply a **standard analysis** to projects with costs equal to or in excess of $20 million. A scaled analysis is more limited in scope than a standard analysis. Scaled analyses can use a streamlined process for the formulation of alternatives and should use justification procedures at a commensurate level of detail to reflect the scope and complexity of the problem being assessed. Like the difference between and EA and an EIS, a scaled analysis should be shorter and have less detail than a standard analysis. EHP staff may apply a standard analysis rather than a scaled analysis to a water resource project with costs between $10 and $20 million if the potential impact of the project to water resources is extensive.

[1] FEMA EHP Instruction Chapter 3.4(F)
[2] FEMA EHP Instruction Chapter 4.4

The Flowchart of PR&G Applicability in Chapter 3 of the FEMA EHP Instruction guides the determination of whether the PR&G is applicable and whether a scaled or standard analysis should apply. The left side of the chart relates the PR&G process to commonly encountered EHP requirements. First, the applicability of the PR&G is confirmed, the level of analysis (standard or scaled) is determined, and then consultation and impacts analysis is conducted before implementing the action. The right side of the chart guides Steps 1 and 2— Once the applicability of the PR&G is confirmed, the flow chart helps decide whether a scaled or standard analysis is appropriate for the project.

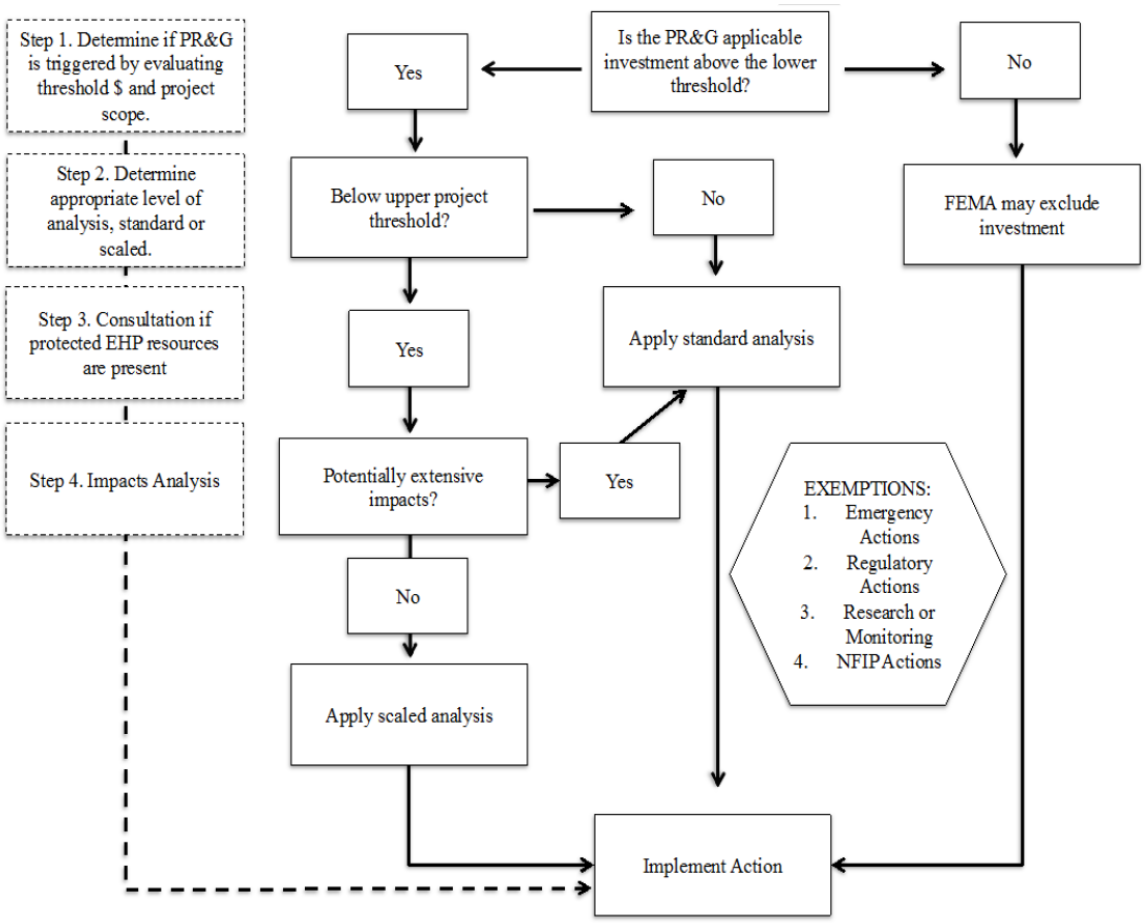

Figure 4: Flowchart of PR&G Applicability for Projects, Programs, and Plans[3]

There are four outcomes of the PR&G Applicability Flow Chart:

- **The PR&G does not apply**

- **Apply a Scaled Analysis where $10,000,000 ≤ Project Cost < $20,000,000**
  Water resource projects with total (unbundled) costs ranging from $10 to $20 million qualify for a scaled analysis.

[3] FEMA EHP Instruction Chapter 3.4(F)(2)(b)(iii)

- **Apply a Standard Analysis where $10,000,000 ≤ Project Cost < $20,000,000, but potential extensive impact to water resource**
  FEMA may choose to apply a standard analysis to a project which qualifies for a scaled analysis because the potential impact to water resources is extensive.
- **Apply a Standard Analysis where Project Cost ≥ $20,000,000**
  Projects with total (unbundled) costs $20 million and over require a standard analysis.

The PR&G Analysis

The PR&G Analysis follows six steps. The six steps are found in Chapter 4 of the FEMA EHP Instruction. When a standalone PR&G analysis is required, the following template provides questions that can assist in completing the PR&G analysis.

Define the Purpose and Need

The first step of the PR&G describes the location and context of the project area and identifies the problems and opportunities which the project is intended to address.

Answer the questions with a narrative.

Describe the study area. The study area is the geographic area affected by the project in a watershed/ecosystem/systems context.

Describe the watershed in which the project will occur. The scale of the described watershed should be large enough area to encompass cause and effect relations among affected resources and activities that are pertinent to realizing public benefits.[4]

Are there other water resource investments within the project area that could be affected?

Other water resource investments within the watershed should be identified when practicable.

State the water resource problems and/or opportunities to be addressed.

The need should be defined in terms of the water resource problem and opportunities that have prompted a project proposal and should be framed in a watershed/ecosystem/systems context. For example, a water resources problem might be to control flooding or improve flood conveyance capacity. An example of a water resources opportunity might be to restore groundwater infiltration.

Describe the cause(s) of the problem, and constraints related to the problem.

The need should identify the cause of the problem and constraints related to the problem.

[4] Principles and Requirements, 2013

EXAMPLES

Feasibility Studies for water resources projects prepared by USACE use a six-step planning process similar to the steps of the FEMA PR&G Agency Specific Procedures. While these are not exact examples of the PR&G process, they have similar steps such as defining water resources problems and opportunities.

Examples:

- Sheridan, Wyoming Ecosystem Restoration Study
  http://www.nwo.usace.army.mil/Portals/23/docs/civil_works/planning/DRAFT_Sheridan_1135_FR-EA_FEB2018.pdf
- Lynnhaven River Basin Ecosystem Restoration
  http://www.nao.usace.army.mil/Portals/31/docs/civilworks/Lynnhaven/Main_Report.pdf
- Mill Creek Flood Risk Management Study
  https://cdm16021.contentdm.oclc.org/digital/collection/p16021coll7/id/937

Formulate a Range of Alternatives

The second step of the PR&G requires the development of a range of alternatives that address the identified problems or opportunities.

Document the range of alternatives, including (1) the proposed alternatives and (2) no action alternative, that address the water resource problem, and achieve the objectives, principles and requirements outlined in the PR&G.

The alternatives should be formulated to address the identified water resource problems and/or opportunities. The alternatives should also achieve the Federal Objective, and the environmental, economic, cultural, and social goals of the PR&G. At a minimum, the alternatives must include the proposed action and the no action alternative.

Do any of the proposed alternatives have multiple discrete measures where one or more of them could perform in a beneficial and sustainable manner without the measures? If yes, does the alternative efficiently and effectively achieve the purpose and need?

For each considered alternative, the description should identify all structural or non-structural measures which together comprise the alternative, and identify whether those measures are discrete. A measure is a feature or activity that can be implemented at a geographic site to address a need. A measure is discrete if it is not dependent upon another measure within the alternative. The alternative should describe the full features and capabilities of each discrete measures. If the alternative has discrete measures, it should be evaluated for whether the alternative is an effective and efficient means of addressing the project purpose and need.[5]

Identify Existing Conditions

The purpose of this step is to establish the baseline conditions of the project area.

List the ecosystem services that flow from the project area ecosystems and infrastructure. Describe the baseline levels of those ecosystem services, to the extent practicable. Identify which of these services may be meaningfully altered as a result of the proposed action or alternatives.

FEMA's PR&G Agency Specific Procedures require an explicit list of ecosystem services that flow from the existing project area ecosystems and infrastructure.[6]

Ecosystem Services

The FEMA PR&G Agency Specific Procedures include a requirement that impacts of the proposed alternatives must be analyzed using an ecosystem services approach. Ecosystem services are benefits that flow from nature to people. These services include the direct and indirect contributions, including economic and social effects, which ecosystems make to the environment and human populations. The Interagency Guidelines categorizes ecosystem services into three general types:[7]

1. Provisioning Services refer to the food, fuel, fiber, and clean water that ecosystems provide.
2. Regulating Services refer to the benefits obtained from the regulation of ecosystem processes. Examples include pollination, storm protection, climate regulation, and water regulation.
3. Cultural Services refer to the benefits ecosystems confer that do not directly relate to our physical health or material well-being. Examples include recreation, aesthetic, religious, existence, and option "values." Whereas the first two of these are experiential, the latter "non-use" values depend simply on the continued survival of the ecosystem and its attributes.

The concept of Provisioning, Regulation, and Cultural ecosystem services was introduced in the Millennium Ecosystem Assessment conducted by the United Nations in 2005. The Millennium Ecosystem Assessment introduced a list of ecosystem services for each category of services (See Table 2).

[5] Interagency Guidelines, 2014.
[6] FEMA EHP Instruction Chapter 4.7(D)(2)
[7] Interagency Guidelines, 2014.

Table 2: Ecosystem Services[8]

Provisioning Services	– Food – Fiber – Fuel – Genetic Resources – Biochemicals, natural medicines, and pharmaceuticals – Ornamental resources – Fresh Water
Regulating Services	– Air quality regulation – Climate regulation – Water regulation – Erosion regulation – Water purification and waste treatment – Disease regulation – Pest regulation – Pollination – Natural hazard regulation
Cultural Services	– Cultural diversity – Spiritual and religious values – Knowledge systems – Educational values – Inspiration – Aesthetic values – Social relations – Sense of place – Cultural heritage values – Recreation and ecotourism

FEMA's PR&G Agency Specific Procedures require an explicit list of services (natural, social, cultural, and economic) that flow from the existing project area ecosystems and infrastructure.[9] Many of the impacts that FEMA typically identifies in Environmental Assessments are linked to ecosystem services. The impacted resource areas in the Environmental Assessment which provide societal benefits should be explicitly identified as ecosystem services. Alternatively, lists of ecosystem services can be used to explore other potential services which may be provided by the study area.

[8] Adapted from Box 2.1 from the Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Synthesis.* Island Press, Washington DC. Available from http://millenniumassessment.org/documents/document.356.aspx.pdf

[9] FEMA EHP Instruction Chapter 4.7(D)(2)

RESOURCE

Available resources which provide lists of ecosystem services:

- Millennial Ecosystem Assessment: https://www.millenniumassessment.org/documents/document.356.aspx.pdf
- Common International Classification of Ecosystem Services: https://cices.eu/
- National Ecosystem Services Classification System: https://www.epa.gov/eco-research/national-ecosystem-services-classification-system-framework-design-and-policy

For ecosystem services which will be meaningfully altered by the proposed Water Resources project, the analysis should identify the projected trend for each service under each alternative. *Best Practices for Integrating Ecosystem Services into Federal Decision Making* (Olander et al, 2005) provides two questions to help assess if an ecosystem service will be meaningfully altered by the proposed action are:

- Is an impact on the ecosystem service likely to be large and strongly driven by the proposed activity?
- Are the expected changes to the ecosystem service going to matter to a lot of people or to groups of special concern?[10]

[10] Olander, L, et al. (2015). "Best Practices for Integrating Ecosystem Services into Federal Decision Making." Durham: National Ecosystem Services Partnership, Duke University. doi:10.13016/M2CH07 Available at https://nicholasinstitute.duke.edu/sites/default/files/publications/es_best_practices_fullpdf_0.pdf

EXAMPLES

Example analyses that provide lists of ecosystems services

- Marsh Project Environmental Assessment: http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/91281_FSPLT3_2575781.pdf
- Cool Soda Project Environmental Assessment: http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/97532_FSPLT3_2396492.pdf
- Valuing Ecosystem Services: Case Studies from Lowland England: http://publications.naturalengland.org.uk/publication/2319433

RESOURCES

Other helpful resources on ecosystem services

- EPA Introduction to Ecosystem Services: https://www.epa.gov/enviroatlas/more-information-ecosystem-services-and-enviroatlas
- Federal Resource Management and Ecosystem Services Guidebook: https://nespguidebook.com/
- Forest Service Ecosystem Services Resources: https://www.fs.fed.us/ecosystemservices/About_ES/index.shtml

Provide a visual representation of the interactions among any natural, social, cultural, and economic systems that affect or are directly affected by the action.

A visual representation of the interactions among natural, social, cultural, and economic systems that affect or are directly affected by the action is required. The Interagency Guidelines suggest using conceptual models to document the relationship and key linkages of resources and services, drivers of change, and impacts of proposed investments.[11]

[11] Interagency Guidelines, 2014.

Conceptual Models

Conceptual models are diagrams composed of multiple causal chains where each chain shows how changes to ecological condition due to an action such as a proposed project or policy change will affect the provision of ecosystem services and their linked societal benefits.[12]

To build the causal chains that collectively complete the conceptual model, the *Federal Resource Management and Ecosystems Guidebook* (National Ecosystem Services Partnership, 2016) suggests considering the following questions sequentially:

1. How does a policy, management decision, or program action affect ecological conditions?
2. How do changes in ecological conditions lead to changes in the delivery of ecosystem services (defined as ecological changes that directly influence people)?
3. How do those changes in the delivery of ecosystem services affect benefits or costs to individuals or groups?[13]

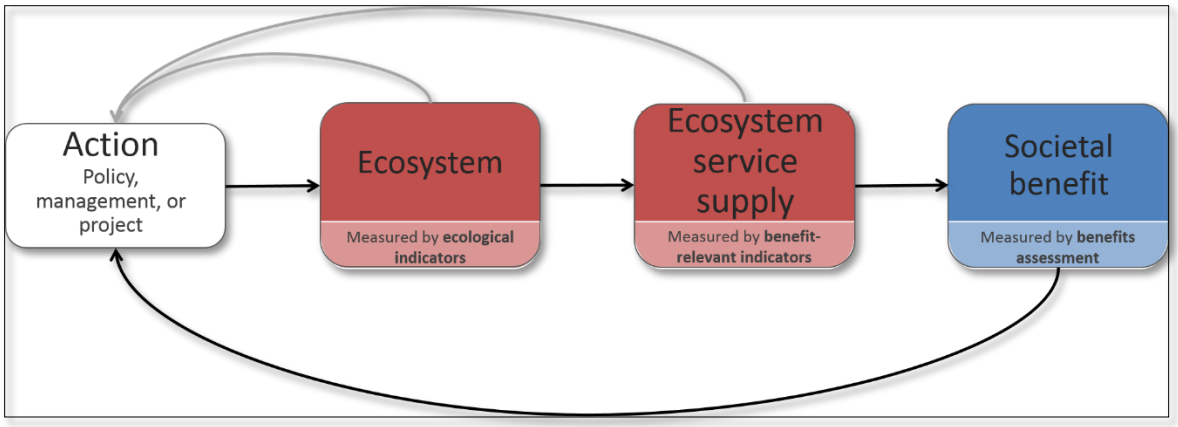

Figure 2: Components of an ecosystem service causal chain (from *Federal Resource Management and Ecosystems Guidebook* (National Ecosystem Services Partnership, 2016)) [14]

Use an iterative process to answer the three questions for as many ecological conditions that will be affected by the decision as can be identified. For the affected area, link the individual causal chains to form the conceptual model.

[12] National Ecosystem Services Partnership, 2017. "Scoping: Conceptual Models," *Federal Resource Management and Ecosystem Services Guidebook.* Available at https://nespguidebook.com/assessment-framework/building-causal-chains/.

[13] National Ecosystem Services Partnership, 2017. "Building Causal Chains," *Federal Resource Management and Ecosystem Services Guidebook.* Available at https://nespguidebook.com/assessment-framework/building-causal-chains/

[14] National Ecosystem Services Partnership, 2017. "Scoping: Conceptual Diagrams," *Federal Resource Management and Ecosystem Services Guidebook.* Available at https://nespguidebook.com/assessment-framework/conceptual-diagrams/.

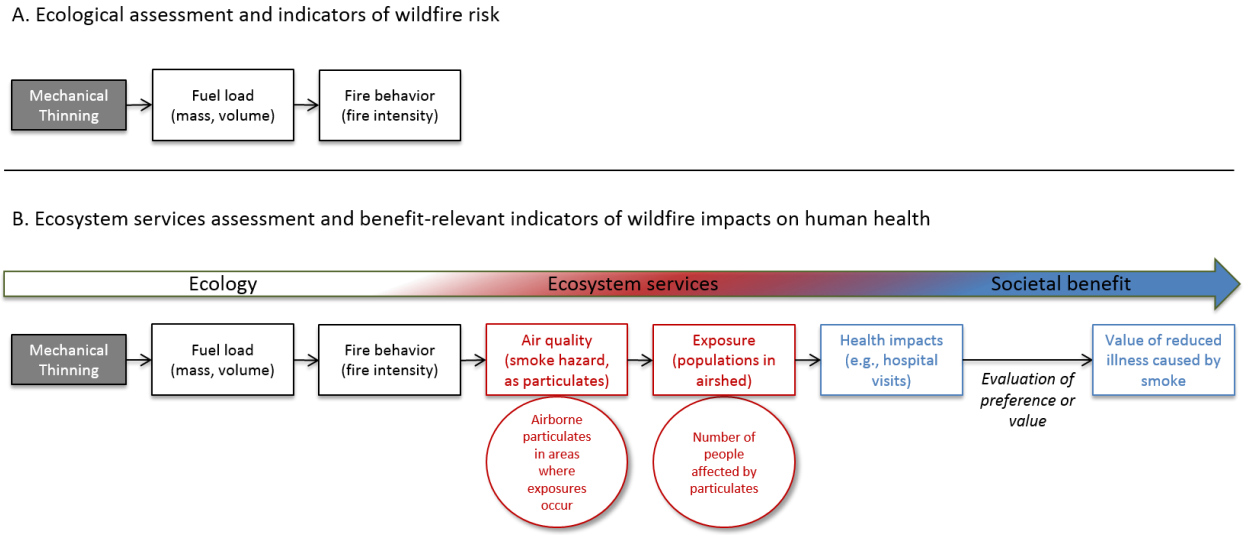

Figure 3: An example of a conceptual model (from *Federal Resource Management and Ecosystems Guidebook* (National Ecosystem Services Partnership, 2016))[15]

Additional guidance on using conceptual models and causal chains can be found in the Federal Resource Management and Ecosystem Services Guidebook.

Project Future Conditions of the Study Area using a watershed, ecosystems, or services approach

The purpose of this step is to project the future conditions or trends of the study area under the no action alternative

What is the expected service or operational life of the project? The estimated projected life should be used as the timeframe for analysis under this step.

Describe the expected service or operational life of the project to establish the timeframe over which impacts will be assessed.

Project the future conditions of the study area using a watershed, ecosystem, or systems approach. Include projections of future conditions that account for the expected environmental, social, cultural, and economic changes as a result of climate change.

The intent of this projection is to understand how key resources and services will change in the future to better compare to future conditions with the investment and serve as a project baseline to assess the effects of each proposed investment.

[15] National Ecosystem Services Partnership, 2017. "Building Causal Chains," *Federal Resource Management and Ecosystem Services Guidebook.* Available at https://nespguidebook.com/assessment-framework/building-causal-chains/

Was a Hydrologic and Hydraulics (H&H) Study performed? If yes, attach H&H study. If no, provide explanation for not performing and documenting an H&H study in the space below.

An H&H study can document the effects of the project on the future conditions of stream or river flows, flood elevations, and the floodway.[16]

List other reasonably foreseeable actions by private and public entities that may affect the water resource.

If other water resource investments have been identified in the watershed, identify foreseeable actions that may be taken which may affect the water source.

Evaluate Alternatives.

For the PR&G analysis, the discussion of alternatives should evaluate how well the alternatives meet (1) the Federal Objective, (2) the Guiding Principles of the Principles and Requirements, and (3) the four formulation criteria of completeness, effectiveness, efficiency, and acceptability.

Describe how each alternative meets the goals of the following PR&G Guiding Principles: (1) Healthy and Resilient Ecosystems, (2) Sustainable Economic Development, (3) Floodplains, (4) Public Safety, (5) Environmental Justice, and (6) Watershed Approach.

Under the PR&G, in addition to meeting the purpose and need, alternatives for the water resources project must also be evaluated against their ability to achieve the **Federal Objective** and conform to the **Guiding Principles**. The Federal Objective and the Guiding Principles are both defined in the Principles and Requirements for Federal Investments in Water Resources.

The Federal Objective

The **Federal Objective** specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

1) Seeking to maximize sustainable economic development;
2) Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
3) Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

PR&G Guiding Principles

The **Guiding Principles** are the six overarching concepts the Federal government seeks to promote through Federal investments in water resources. The Guiding Principles are:

1. Healthy and Resilient Ecosystems
2. Sustainable Economic Development
3. Floodplains
4. Public Safety
5. Environmental Justice
6. Watershed Approach

[16] FEMA EHP Instruction Chapter 4.7(E)(1)

Each Guiding Principle is further defined in Section 4.3 of the FEMA EHP Instruction. FEMA's PR&G Agency Specific Procedures require a comparison of how each alternative performs against the Guiding Principles. The assessment of the alternatives against the Guiding Principles should identify where tradeoffs exist in terms of achieving one Principle over another. As with NEPA, the PR&G does not require the selection any particular alternative.

A table matrix can aid in displaying how each alternative meets the Guiding Principles.

	Guiding Principles					
Alternatives	Healthy and Resilient Ecosystems	Sustainable Economic Development	Floodplains	Public Safety	Environmental Justice	Watershed Approach
No Action Alternative						
Alternative 1…						

How do the public benefits compare to the public costs of the alternatives?

The PR&G require FEMA to account for the public benefits and costs of the proposed alternatives. Public benefits and costs can be quantified using FEMA's Benefit Cost Analysis (BCA) Tool. Sea level rise estimates and environmental benefits should be included in the cost benefit analysis when appropriate.

Was sea level rise included in the Benefit Cost Analysis?

Indicate if sea level rise was included in the benefit cost analysis.

Were environmental benefits included in the benefit cost analysis?

Indicate if environmental benefits were included in the benefit cost analysis.

For each alternative, describe the projected trends of the ecosystem services likely to be meaningfully altered (as identified in the Existing Conditions). The future conditions projections should account for expected changes as a result of climate variability and climate change.

Qualitatively or quantitatively describe the direction and magnitude of change (positive/negative, large/small) of each of the ecosystem services identified as likely to be meaningfully altered (as identified in the Existing Conditions) under each alternative.

Display the Effects and Comparison of Alternatives

Display the effects of the alternatives and the comparison of the alternatives for their contributions to the PR&G.

Displays may include graphs, charts, tables, drawings, photographs, summary statements, or other indications of impacts.[17]

Identify the tradeoffs among the economic, environmental, and social goals for the proposed action and alternatives. Identify any effects that are irreversible or that have high end-of-lifecycle costs to reverse.

Discuss the differences among the alternatives in terms of the effectiveness of the alternative in solving the purpose and need in comparison to changes in the economic, environmental, or social conditions under the alternative.

Explain how the economic, environmental, and social benefits justify the costs of the proposed action.

Provide a discussion of how the benefits of the selected action justify the costs.

Explain how the selected alternative adequately attains the goals outlined in the Guiding Principles.

Discuss how the identified tradeoffs affect the level of attainment within the Guiding Principles for the selected alternative.

[17] Interagency Guidelines, 2014.

Integrating PR&G and the National Environmental Policy Act (NEPA) Documents

Relationship of PR&G and NEPA Reviews

The PR&G will only apply to a subset of the projects to which NEPA applies. Where the PR&G applies, and an Environmental Assessment (or Environmental Impact Statement) is required under NEPA, the Interagency Guidelines encourage agencies to integrate the two analyses, and the PR&G analysis can be incorporated within the NEPA document.

Because the PR&G applicability and NEPA applicability are based on different criteria, the PR&G may apply where projects qualify for a CATEX or a STATEX. For these projects, EHP staff should prepare a stand-alone PR&G analysis.

The PR&G and NEPA have similar requirements and considerations, but some requirements of the PR&G are not covered by the NEPA analysis. Under the PR&G, in addition to addressing the purpose and need, project alternatives are evaluated for their ability to meet the goals of the PR&G, and the environmental impacts of the alternatives must be described using an ecosystem services approach. FEMA's PR&G Agency Specific Procedures have six steps that roughly correspond to chapters within Environmental Assessments. When the PR&G and NEPA analyses are incorporated together, the document should identify where analysis is specific to requirements of the PR&G. Analysis requirements unique to the PR&G are summarized in Table 1 and are furthered described in the following sections.

Table 1: Relationship between Environmental Assessment Chapters and PR&G Agency Specific Procedure Steps

Environmental Assessment Chapter	Corresponding PR&G Section- Chapter 4.7 of EHP Instruction	Additional PR&G Requirements
Introduction Purpose and Need	B. Define Purpose and Need	Introduction must: • Use a watershed approach to describe the project area • Identify other water resources investments within the project area when practicable Purpose and Need must: • Identify the water resource problems or opportunities that have prompted a project proposal

Environmental Assessment Chapter	Corresponding PR&G Section- Chapter 4.7 of EHP Instruction	Additional PR&G Requirements
Alternatives	C. Formulate a Range of Alternatives F. Evaluate Alternatives	Alternatives must: • Describe how each alternative achieves the Federal Objective and conforms to each of the Guiding Principles defined in FEMA EHP Instruction Chapter 4.3 • Evaluate each alternative for the provision of public benefits and public costs using benefit cost analysis. The benefit costs analysis should include sea level rise and environmental benefits when appropriate. • Identify and discuss tradeoffs between the achievement of economic, environmental, cultural, and social goals for the proposed action and alternatives, and discuss how the benefits of the proposed action justify the costs
Affected Environment and Potential Impacts	D. Identify Existing Conditions E. Project Future Conditions of the Study Area F. Evaluate Alternatives	The Affected Environment descriptions must: • Use the service life of the project as the timeframe for the analysis • Identify and list the ecosystem services provided by the project area • Provide a visual representation of the interactions among ecosystem services affected by the action • Project the trend of each ecosystem service likely to be meaningfully altered under each alternative, and account for the expected changes as a result of climate change • Hydrologic and Hydraulic analysis to quantify the impacts to water resources, such as changes to river flows or flood elevations
Impacts Matrix	G. Display the Effects and Comparison of Alternatives	• Displays must visualize the tradeoffs of the alternatives for their contributions to the Federal Objective and Guiding Principles

Introduction and Purpose and Need

FEMA's PR&G Agency Specific Procedures contain specific requirements for the project scope and Purpose and Need. In the Introduction, the project area should be described in a watershed/ecosystem/systems context. Other water resources investments within the project area that could be affected should be identified when practicable.

FEMA's PR&G Agency Specific Procedures also specify that the Purpose and Need Statement of the NEPA analysis should include a description of the water resources challenge(s) that have prompted a project proposal. The water resource challenge should be described in terms of the problems or opportunities to be addressed, the cause(s) of the problem, and constraints related to the problem. For example, a water resources problem might be to control flooding or improve flood conveyance capacity. An example of a water resources opportunity might be to restore groundwater infiltration.

Alternatives

Like NEPA, FEMA's PR&G Agency Specific Procedures require FEMA to evaluate a range of alternatives, including the no action alternative.

Under Formulate a Range of Alternatives, the FEMA PR&G Agency Specific Procedures specify that if an alternative can be broken into discrete measures, and one of those measures could perform in a beneficial and sustainable manner independently, then FEMA must evaluate those measures as discrete units. The discrete measures do not have to be evaluated as independent alternatives themselves, but the description of the alternative containing the discrete measures should describe the full features and capabilities of each measure, and the alternative should be evaluated for whether it is an effective and efficient means of addressing the project purpose and need.

When evaluating alternatives, FEMA's PR&G Agency Specific Procedures require that, in addition to meeting the purpose and need, the alternatives for the water resources project must also be evaluated against their ability to achieve the **Federal Objective** and conform to the **Guiding Principles**. See the subsections on the Federal Objective and Guiding Principles for more information. FEMA's PR&G Agency Specific Procedures require a comparison of how each alternative performs against the Guiding Principles. The assessment of the alternatives against the Guiding Principles should identify where tradeoffs exist in terms of achieving one Principle over another. As with NEPA, the PR&G does not require the selection of any particular alternative.

The FEMA PR&G Agency Specific Procedures also require FEMA to evaluate the benefits and costs of each alternative. FEMA's benefit cost analysis tool can be used for this purpose. Where appropriate, the benefit cost analysis should account for sea level rise and include environmental benefits. The alternatives discussion should identify and discuss tradeoffs between the achievement of economic, environmental, cultural, and social goals for the proposed action and alternatives, and discuss how the benefits of the proposed action justify the costs.

Affected Environment and Potential Impacts

As under NEPA, FEMA's PR&G Agency Specific Procedures require a description of the physical setting and information on the existing environment, or baseline conditions for those resources or areas of concern that may be affected by the proposed alternative. This description correlates to the step of Identify Existing Conditions in the PR&G. To comply with the PR&G, the expected service or operational life of the project must be used as the timeframe for the analysis.

The step of Projecting Future Conditions of the Study Area is synonymous with the analysis of the impacts of the No Action alternative. The analysis of the impacts of the other alternatives in the FEMA PR&G Agency Specific Procedures falls under the step of Evaluate Alternatives. To satisfy the requirements of the PR&G, an explicit list of ecosystem services must be provided. See the Ecosystem Services section of for more information. The discussion should identify the ecosystem services likely to be meaningfully altered by the alternatives, and project the trends for each of those service. Additionally, to meet the requirements of the PR&G, the alternatives assessments should account for the expected environmental, social, cultural, and economic changes as a result of climate change. The level of detail provided in the discussion should be commensurate with the level (scaled or standard) of PR&G analysis.

For the Water Resources section of the Affected Environment, information from Hydrologic and Hydraulic (H&H) analyses can be utilized to project impacts of the alternatives on future water resource conditions.

Impacts Matrix

FEMA's PR&G Agency Specific Procedures require FEMA to display the effects of alternatives and the comparison of the alternatives for their contribution to the PR&G in an appropriate form. Utilizing an Impacts Matrix within the Environmental Assessment would meet this criteria.